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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/196,683	11/20/1998	SEIJI MIZUNO	2013/14	9431

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EXAMINER

CREPEAU, JONATHAN

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 01/02/2002

17

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/196,683

Applicant(s)

MIZUNO, SEIJI

Examiner

Jonathan S. Crepeau

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 October 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 4-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 4-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 1 and 4-19. New grounds of rejection have been applied to all the claims under 35 USC §103. Accordingly, this action is non-final.

Claim Rejections - 35 USC § 103

2. Claims 13, 14, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bloomfield et al (U.S. Pat. 5,989,741), in view of the MatWeb reference entitled “Shore (Durometer) Hardness Testing of Plastics” (hereafter “the first MatWeb reference”) and the MatWeb reference entitled “Overview - Thermoset Polyurethane, Adhesive” (hereafter “the second MatWeb reference”).

In column 8, lines 14-40, Bloomfield et al. disclose a polymer electrolyte membrane and gas diffusion electrode assembly which is bonded to support frames with a layer of polyurethane adhesive. The support frames define anode and cathode compartments, and thus function as separators.

Bloomfield et al. do not expressly teach that the polyurethane has a durometer A hardness of not greater than 90 after cure.

The first MatWeb reference teaches that the Durometer hardness is also known as the “Shore” hardness.

The second MatWeb reference discloses that an average value of Shore A hardness of a polyurethane adhesive is 45.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be reasonably apprised by the first and second MatWeb references that the Durometer (Shore) A hardness of the polyurethane adhesive would be under 90, as claimed. Therefore, although a Shore A hardness of 45 would not necessarily be inherently present in the polyurethane of Bloomfield, the artisan could reasonably expect this to be the case based on the general nature of the data in the second MatWeb reference. Accordingly, the instantly claimed hardness range is not considered to distinguish over the Bloomfield reference.

3. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bloomfield et al. in view of the first and second MatWeb references as applied to claims 13, 14, and 19 above, in further view of Salfelder et al (U.S. Pat. 5,636,098), and the MatWeb reference entitled "Overview – Silicone, RTV, Adhesive/Sealant Grade" (hereafter "the third MatWeb reference"), and the MatWeb reference entitled "Overview – Epoxy Adhesive" (hereafter "the fourth MatWeb reference").

Bloomfield et al. do not expressly teach that the adhesive may be a mixture of epoxy resin and modified silicone.

In column 8, lines 50-57, Salfelder et al teach that conventional adhesives are used to adhere two insulating layers together. Salfelder et al disclose that suitable adhesives include "acrylics such as methacrylate, polyesters, polyamides, polyurethanes, epoxies, silicone containing adhesives, and mixtures thereof".

The third MatWeb reference discloses that an average value of Shore A hardness of a silicone adhesive is 29.8.

The fourth MatWeb reference discloses that an average value of Shore D hardness of an epoxy adhesive is 74.5.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because as exemplified by the teaching of Salfelder et al, polyurethanes, epoxies, and silicones are all conventional materials for adhering two objects together. Therefore, the skilled artisan would be able to use equivalent materials to adhere the membrane electrode assembly of Bloomfield et al to the separators. Substitution of equivalents does not require express motivation as long as the prior art recognizes the equivalency (see *In re Fout*, 312 USPQ 532 (CCPA 1982)). Furthermore, the courts have held that it is *prima facie* obvious to combine two compositions, each of which is taught by the prior art to be useful for the same purpose (in this case, epoxy and silicone) in order to form a third composition which is to be used for the very same purpose (*In re Kerkhoven*, 205 USPQ 1069 (CCPA 1980)). Salfelder even hints that a silicone and epoxy combination is known by using the phrase "and mixtures thereof" after the disclosure of the adhesive species.

Additionally, it could reasonably be expected that a mixture of epoxy and silicone (and polyurethane) would have a Shore A hardness of less than 90. As noted above, the third and fourth MatWeb references list silicone as having a Shore A hardness of around 30, and epoxy as having a Shore D hardness of around 75. Accordingly, a mixture involving any of these three components would likely have a Shore A hardness of less than 90.

4. Claims 8-11 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bloomfield et al in view of Salfelder et al. in view of the first, second, third, and fourth MatWeb references as applied to claim 15 above, and further in view of Schmid et al (U.S. Patent 6,080,503).

Neither Bloomfield et al. nor Salfelder et al. expressly teach that the adhesive has a modulus of elasticity of not greater than 10 MPa after cure. However, the second MatWeb reference discloses that polyurethane has an average modulus of elasticity of 0.18 GPa (180 MPa), with a low measurement of 0.02 GPa (20 MPa). Additionally, the third MatWeb reference discloses that silicone has an average modulus of elasticity of 0.62GPa (620 MPa), based on only one measurement.

In column 1, lines 49-54 and in column 2, lines 26-40, Schmid et al. teach that “resilient gaskets or seals” are typically provided in PEM cell stacks, and that decreased resilience of the seals over time leads to an increase in leaks.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of Schmid et al. to make the seals of Bloomfield et al. as resilient (elastic) as possible, thereby providing a modulus of elasticity of less than 10 MPa. Since a lower modulus of elasticity allows for increased deformation (strain) of a material with the same stress applied, thereby allowing the material to be more “resilient” or “elastic,” the artisan would be motivated by the disclosure of Schmid to modify the adhesive composition(s) of Bloomfield and Salfelder in order to decrease the modulus of elasticity. The artisan would additionally be motivated to lower the hardness of the adhesives, also in view of Schmid’s teachings of resiliency.

5. Claims 1, 4-6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bloomfield et al. in view of Salfelder et al. in view of the first, second, third, and fourth MatWeb references in view of Schmid et al. as applied to claims 8-11 and 18 above, and further in view of Palmer (U.S. Patent 4,804,451)

Bloomfield et al. do not expressly teach that the polymer electrolyte has a molar water fraction of less than 4.

The patent of Palmer is generally directed to electrodialysis and electrodeionization apparatuses using ion exchange membranes. In column 1, lines 47-61, the reference teaches that in devices in which membranes are bonded to frames with an adhesive, the bonds are weak because the membrane surfaces are wet.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the Palmer reference exemplifies that the practice of reducing the water content of ion-exchange membranes prior to bonding is well known in the art. The artisan would thereby be motivated to reduce the water content of the membrane of Bloomfield prior to bonding in hopes of improving the sealability of the membrane with the separators. Accordingly, the recitation of a molar water fraction of less than 4 is not considered to patentably distinguish over the references.

6. Claims 7, 12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bloomfield et al in view of Salfelder et al. in view of the first, second, third, and fourth MatWeb references in view of Schmid et al. in view of Palmer as applied to claims 1, 4-6 and 17 above, and further in view of Tamura et al (U.S. Pat. 5,328,816).

The combination of Bloomfield et al and Salfelder et al do not explicitly teach that resin beads of a predetermined diameter are included in the adhesive.

In column 4, lines 45-53 Tamura et al teaches that two substrates are laminated together with an adhesive containing spacer beads of a uniform particle diameter.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Tamura et al shows that using resin beads in an adhesive is a conventional method of keeping a uniform distance between

two adhered substrates. The artisan would therefore be able to use this teaching as a way of keeping the thickness of the membrane/frame adhesion layer of Bloomfield et al at a predetermined value. Thus, this limitation is considered to be obvious to one of ordinary skill in the art.

Conclusion


7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gabrielle Brouillette, can be reached at (703) 308-0756. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 305-5408 or (703) 305-5433.

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

JSC

December 30, 2001


STEPHEN KALAFUT
PRIMARY EXAMINER
GROUP 1700